

§ 23.1303

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§ 23.1303 Flight and navigation instruments.

The following are the minimum required flight and navigation instruments:

- (a) An airspeed indicator.
- (b) An altimeter.
- (c) A direction indicator (non-stabilized magnetic compass).
- (d) For reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and turbine engine powered airplanes, a free air temperature indicator or an air-temperature indicator which provides indications that are convertible to free-air.
- (e) A speed warning device for—
 - (1) Turbine engine powered airplanes; and
 - (2) Other airplanes for which VMO/MMO and VD/MD are established under §§ 23.335(b)(4) and 23.1505(c) if VMO/MMO is greater than 0.8 VD/MD.

The speed warning device must give effective aural warning (differing distinctively from aural warnings used for other purposes) to the pilots whenever the speed exceeds VMO plus 6 knots or MMO+0.01. The upper limit of the production tolerance for the warning device may not exceed the prescribed warning speed. The lower limit of the warning device must be set to minimize nuisance warning;

(f) When an attitude display is installed, the instrument design must not provide any means, accessible to the flightcrew, of adjusting the relative positions of the attitude reference symbol and the horizon line beyond that necessary for parallax correction.

(g) In addition, for commuter category airplanes:

- (1) If airspeed limitations vary with altitude, the airspeed indicator must have a maximum allowable airspeed indicator showing the variation of V_{MO} with altitude.
- (2) The altimeter must be a sensitive type.
- (3) Having a passenger seating configuration of 10 or more, excluding the pilot's seats and that are approved for IFR operations, a third attitude instrument must be provided that:
 - (i) Is powered from a source independent of the electrical generating system;

- (ii) Continues reliable operation for a minimum of 30 minutes after total failure of the electrical generating system;

- (iii) Operates independently of any other attitude indicating system;

- (iv) Is operative without selection after total failure of the electrical generating system;

- (v) Is located on the instrument panel in a position acceptable to the Administrator that will make it plainly visible to and usable by any pilot at the pilot's station; and

- (vi) Is appropriately lighted during all phases of operation.

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§ 23.1305 Powerplant instruments.

The following are required powerplant instruments:

- (a) *For all airplanes.* (1) A fuel quantity indicator for each fuel tank, installed in accordance with § 23.1337(b).

- (2) An oil pressure indicator for each engine.

- (3) An oil temperature indicator for each engine.

- (4) An oil quantity measuring device for each oil tank which meets the requirements of § 23.1337(d).

- (5) A fire warning means for those airplanes required to comply with § 23.1203.

- (b) *For reciprocating engine-powered airplanes.* In addition to the powerplant instruments required by paragraph (a) of this section, the following powerplant instruments are required:

- (1) An induction system air temperature indicator for each engine equipped with a preheater and having induction air temperature limitations that can be exceeded with preheat.

- (2) A tachometer indicator for each engine.

- (3) A cylinder head temperature indicator for—

- (i) Each air-cooled engine with cowl flaps;

- (ii) [Reserved]

- (iii) Each commuter category airplane.

- (4) For each pump-fed engine, a means: